PLD	Standard	Minimally Proficient	Partially Proficient	Proficient	Highly Proficient
		The Minimally Proficient student	The Partially Proficient student	The Proficient student	The Highly Proficient student
Number and Quantity					
Detailed	N-RN.A [1 to 2]	Uses proper notation and uses structure for integer exponents only. Converts radical notation to rational exponent notation.	Uses proper notation for radicals in terms of rational exponents, but is unable to explain the meaning. Identifies equivalent forms of expressions involving rational exponents (but is not able to re- write or find the product of multiple radical expressions).	Explains and uses the meaning of rational exponents in terms of properties of integer exponents, and uses proper notation for radicals in terms of rational exponents. Rewrites expressions involving radicals and rational exponents, using the properties of exponents; identifies equivalent forms of expressions involving rational exponents; and converts radical notation to rational exponent notation.	Proves, uses, and explains the properties of rational exponents (which are an extension of the properties of integer exponents), and extends to real world context. Compares contexts where radical form is preferable to rational exponents, and vice versa.
Detailed	N-CN.A [1 to 2]	Recognizes that the square root of a negative number is not a real number. Adds, subtracts, and multiplies using single operations with complex numbers (e.g.: 4i + 5i =9i).	Converts simple "perfect" squares to complex number form (bi) , such as the square root of -25 is 5i. Uses the Commutative, Associative, and Distributive properties to	Knows that there is a complex number i such that i^2=-1 , and identifies the proper a+bi form (with a and b real). Calculates sums and products of complex numbers for	Generalizes or develops a rule that explains complex numbers and their properties. Generalizes or develops rules for abstract problems, such as explaining what type of

			identify products and sums of complex numbers.	multi-step problems.	expression results, when given (a + bi)(c + di).
Algebra					
Detailed	A-SSE.A [2]; A-SSE.B [3c]	Identifies structure used to rewrite polynomial expressions.	Identifies structure used to rewrite rational, polynomial, and exponential expressions with rational or real exponents.	Recognizes equivalent forms of complicated expressions, particularly those involving rational, polynomial, or exponential functions with rational or real exponents, and uses the structure of the expression to identify ways to rewrite it.	Rewrites complicated expressions (including those involving rational, polynomial, or exponential functions with rational or real exponents) to equivalent forms using the structure of the expression. Makes generalizations by rewriting expressions in context using their structure.
Detailed	A-SSE.B [4]; F-BF.A [2]	Recognizes if a sequence is arithmetic, geometric, or neither.	Writes arithmetic and/or geometric sequences with an explicit formula.	Writes arithmetic and geometric sequences both recursively and with an explicit formula.	Models contextual situations with arithmetic and geometric sequences (as appropriate).
Detailed	A-APR.B [2]	Given a polynomial in factored form, identifies the zeroes of the polynomial.	Divides a polynomial by a factor (x - a).	Using the Remainder Theorem, decides whether (x - a) is factor of a given polynomial.	Explains why (x-a) is a factor of p(x)=0 when p(a)=0.
Detailed	A-APR.B [3]	Identifies the zeroes of a function from a graph.	Uses zeroes to sketch the graph of a function given in factored form.	Factors a polynomial and uses zeroes to sketch a graph of the function.	Identifies zeroes from a graph and uses zeroes to construct the function.

Detailed	A-APR.C [4]	Identifies a polynomial identity.	Justifies a polynomial identity by testing with specific numbers.	Proves polynomial identities and uses them to describe numerical relationships.	Algebraically justifies the validity of polynomial identities. Uses the identity to describe numerical relationships in a given context.
Detailed	A-APR.D [6]	Rewrites simple rational expressions in different forms, such as rewriting a(x)/x in the form q(x) + 0 , where a(x) and q(x) are polynomials.	Rewrites simple rational expressions in different forms, such as rewriting a(x)/x in the form q(x) + r/x , where a(x) and q(x) are polynomials and r is an integer.	Rewrites simple rational expressions in different forms, such as rewriting a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x) and r(x) are polynomials, with the degree of r(x) less than the degree of b(x).	Rewrites simple rational expressions in different forms such as rewriting a(x)/b(x) in the form q(x) + r(x)/b(x) where a(x) , b(x), q(x) and r(x) are polynomials, with the degree of r(x) less than the degree of b(x) , and b(x) with degree 2 or above.
Detailed	A-CED.A [1]	Identifies exponential equation with integer exponents that models a given situation.	Identifies exponential equation with rational or real exponents and rational functions that models a given situation.	Creates a rational or exponential equation with rational or real exponents and uses it to solve problems.	Explains the meaning of solutions (including extraneous), in reference to context.
Detailed	A-REI.A [1]	Solves simple rational or radical equations with multiple steps, without justifying the steps involved in solving.	Describes the steps in solving simple rational or radical equations.	Explains and justifies the steps in solving simple rational or radical equations by applying the properties of equality, inverse, and identity.	Explains and justifies the steps in solving simple rational and radical equations by applying naming properties.
Detailed	A-REI.A [2]	Identifies simple rational	Identifies the number of	Solves simple rational	Solves complicated

		and radical equations.	solutions and extraneous solutions, given a simple rational or radical equation.	and radical equations and identifies extraneous solutions.	rational and radical equations and justifies extraneous solutions.
Detailed	A-REI.B [4b]; N-CN.C [7]	Solves quadratic equations by simple inspection. Understands the meaning of a complex number.	Solves quadratic equations by factoring. Understands the meaning of a complex number and identifies when quadratic equations will have non-real solutions (but is unable to identify the complex solution).	Solves quadratic equations by inspection (e.g., for x^2 = 49)-- taking square roots, completing the square, the quadratic formula, and factoring-- as appropriate to the initial form of the equation. In the case of equations that have roots with nonzero imaginary parts, writes the solutions as a ± bi for real numbers a and b.	Determines the most efficient method for solving a quadratic equation and justifies the choice selected. Creates a quadratic function without x - intercepts, and verifies that the solutions are complex.
Detailed	A-REI.C [6 to 7]	Identifies by inspection the number of solutions for a system of equations.	Finds approximate solutions of a system of equations from a graph.	Solves a simple system of equations algebraically and graphically.	Generalizes the number of solutions to a system of equations.
Detailed	A-REI.D [11]	Finds the solution to f(x)=g(x), where f(x) and g(x) are linear, and the solution to quadratic functions presented in a graph.	Finds the solution to f(x)=g(x), where f(x) and g(x) are absolute value and exponential functions.	Finds the solution to f(x)=g(x), where f(x) and g(x) are polynomial, rational, radical, absolute value, exponential, or logarithmic functions presented in different forms. Justifies why the x -coordinates of the	Interprets solutions to f(x)=g(x), where f(x) and g(x) are polynomial, rational, radical, absolute value, exponential, or logarithmic functions presented in different forms, in reference to context.

				points of intersection are solutions to the equation f(x)=g(x).	
Functions					
Detailed	F-IF.B [4 to 5]; F-IF.C [9]	Interprets key features of graphs and tables that model a linear function. Sketches graphs showing key features, given a verbal description of a linear relationship.	Interprets key features of graphs and tables that model a quadratic function. Sketches graphs showing key features, given a verbal description of a quadratic relationship.	Interprets key features of graphs and tables that model a function that is neither linear nor quadratic. Sketches graphs showing key features, given a verbal description of a relationship that is not linear or quadratic.	Interprets complex features of a function modeling a real-world context, given a verbal description.
Detailed	F-IF.B [6]	Calculates and interprets the average rate of change of a simple rational function over a specified interval from a graph of the function.	Calculates and interprets the average rate of change of a polynomial or radical function over a specified interval. Estimates the rate of change from a graph of a function.	Calculates and interprets the average rate of change of a logarithmic or trigonometric function over a specified interval. Estimates the rate of change from a graph.	Compares the average rate of change of two non-linear and non-quadratic functions over a specified interval.
Detailed	F-IF.C [7c and 7e]; F-IF.C [8b]	Graphs quadratic functions and identifies zeroes and describes end behavior. Graphs simple exponential functions and identifies intercepts and end behavior.	Chooses the graph of a polynomial function (degree 3 or higher) that matches given key features. Graphs complex exponential functions and simple logarithmic and trigonometric functions and describes key	Graphs a polynomial function (degree 3 or higher); correctly identifies zeroes and describes end behavior. Graphs any exponential or logarithmic function and describes key features. Graphs trigonometric functions	Identifies additional features (such as multiplicity of zeroes, locations of minimums and maximums, domain and range appropriate to a context, or intervals where the function is increasing or decreasing) for a

			features.	with at most 2 transformations.	polynomial function of degree 3 or higher. Graphs trigonometric functions with 3 or more transformations.
Detailed	F-BF.A [1a to 1b]	Adds a constant to a function or multiplies a function by a constant to model a real-world context.	Applies arithmetic operations to multiple linear or exponential functions to build a new function to model a real-world context.	Combines standard functions using arithmetic operations.	Determines whether combining two functions is appropriate to a context, and performs the correct operations.
Detailed	F-BF.B [3]	For a linear and exponential function, f(x), identifies the effect on the graph of replacing f(x) with f(x) + k, k(f(x)), f(kx), and f(x + k) for specific values of k (both positive and negative). Estimates the value of k given the graphs. Compares two functions of the same kind that differ by a transformation, and identifies the transformation.	For quadratic and logarithmic functions, f(x), identifies the effect on the graph of replacing f(x) with f(x) + k, k(f(x)), f(kx), and f(x + k) for specific values of k (both positive and negative). Estimates the value of k given the graphs. Compares two functions of the same kind that differ by a transformation, and identifies the transformation.	For any function, f(x), identifies the effect on the graph of replacing f(x) with f(x) + k, k(f(x)), f(kx, and f(x + k) for specific values of k (both positive and negative). Estimates the value of k given the graphs. Compares two functions of the same kind that differ by a transformation, and identifies the transformation.	Recognizes even and odd functions from their graphs and algebraic expressions.
Detailed	F-BF.B [4a]	Finds inverse functions for linear functions. Identifies whether a function has an inverse from its graph.	Identifies whether a function has an inverse from any representation.	Finds the inverse function for a simple non-linear function, if it exists.	Restricts the domain of a function in order to find its inverse.

Detailed	F-IF.A [3]; F-LE.A [2]	Identifies the parts of a recursive function or sequence.	Defines and expresses a recursive sequence as a function, constructs a linear function (multi-step) given a graph, a description of a relationship, or two input-output pairs.	Recognizes that sequences are functions. Recognizes that a sequence has a domain, which is the subset of integers, and can generate a sequence given a recursive function, constructs a linear function (multi-step) given a graph, a description of a relationship, or two input-output pairs.	Applies the ideas of sequences being functions to real world contexts.
Detailed	F-LE.A [4]	Evaluates a logarithm using technology.	Expresses a logarithmic expression (with no variables) in equivalent exponential form.	Expresses the solution to ab^(ct)=d as a logarithm (where b is 2, 10, or e). Evaluates a logarithm using technology.	Applies logarithms to solve for variables in exponents for contextual problems (such as continuous interest or uninhibited growth/decay).
Detailed	F-TF.A [1]	Knows that a full rotation of a circle is 2π radians.	Locates a radian measure between 0 and 2π on a unit circle.	Locates any radian measure on a unit circle.	Explains that the radian measure of an angle is equivalent to the length of the arc on the unit circle subtended by the angle.
Detailed	F-TF.A [2]	Identifies the sine and cosine of angles in the first quadrant of a unit circle. Recognizes that the coordinates of any	Identifies the sine and cosine of angles on the unit circle.	Explains that one can travel around the unit circle any real number of units and arrive at a set of coordinates that	Explains that one can travel around any circle any real number of units and arrive at a set of coordinates that

		point on the unit circle may be defined as (cos θ, sin θ).		defines trigonometric functions for all real numbers.	defines trigonometric functions for all real numbers.
Detailed	F-TF.B [5]	Identifies the amplitude, frequency, and midline of a given trigonometric function.	Writes a trigonometric function (given a specific amplitude, frequency, and midline).	Writes an appropriate trigonometric function to model a real-world context (where the information about amplitude, frequency, and midline are given clearly).	Analyzes a real-world context to determine which information can be used to write a trigonometric function. Uses this analysis to model the context with a trigonometric function.
Detailed	F-TF.C [8]	Shows that the Pythagorean Identity is valid, given numerical values for the identity.	Finds an unknown trigonometric value by using the Pythagorean Identity.	Proves the Pythagorean Identity sin^2x+cos^2x= , and uses it to find basic trig values, given one trig value and the quadrant.	Extends the Pythagorean Identity to prove that trig ratios are constant for similar triangles.
Geometry					
Detailed	G-GPE.A [2]	Identifies the directrix and focus of a parabola when given its graph.	Identifies the directrix and focus of a parabola when given the equation.	Derives the equation of a parabola, given a focus and directrix.	Justifies conditions for when a point is or is not part of a parabola, given information about the focus and directrix.
Statistics					
Detailed	S-ID.A [4]	Labels a blank normal distribution curve with the appropriate mean and standard deviations.	Uses the Empirical Rule to label a blank normal distribution curve with the appropriate percentages (68%-95%-99.7%).	Uses the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages using the	Additionally, recognizes that there are data sets for which such a procedure is not appropriate. Uses technology or tables to

				Empirical Rule.	estimate areas under the normal curve.
Detailed	S-ID.B [6a]	Creates a scatter plot of bivariate data.	Determines if a plotted data set is approximately linear.	Creates a scatter plot of bivariate data and estimates an exponential (with domains not in the integers) or trigonometric function that fits the data. Uses this function to solve problems in the context of the data.	Compares the fit of different functions to data and determines which function has the best fit.
Detailed	S-IC.A [1]	Describes why a particular sample is not representative.	Describes why a particular sample is not random. Determines what inferences can be made about a population from a given representative random sample.	Explains why a representative random sample is appropriate to make inferences about a population. Explains how a sample may be random, but not representative of the underlying population, or how a sample may be representative, but not random.	Explains how to select a representative random sample from a particular population.
Detailed	S-IC.A [2]	Given two results, decides which is more consistent with a specific data-generating process.	Explains why a specific model is not consistent with given data-generated results.	Decides if a specified model is consistent with results from a given data-generating process, such as a simulation.	Designs a data-generating process (e.g., simulation) to evaluate whether a specified model is consistent with given results.

Detailed	S-IC.B [3]	Identifies whether random sampling was used in a particular study.	Matches a given study to its category: survey, observational study, or experiment.	Explains the differences among sample surveys, experiments, and observational studies. Explains how randomization relates to each type of study.	Explains the purposes and limitations of sample surveys, experiments, and observational studies. Designs an appropriate study for a given situation.
Detailed	S-IC.B [4]	Chooses an interval that represents possible population proportions or means, for a particular sample proportion or mean.	Interprets whether a particular proportion is possible, given a sample proportion or mean in context and a margin of error.	Uses +/-2 standard deviations from a sample proportion or mean to create an interval that can be used to estimate possible population proportion or mean.	Develops a margin of error for a given survey through use of a simulation model.
Detailed	S-IC.B [5]	Determines if the differences between two treatments are typically positive, negative, or centered about zero, given results of a randomized experiment comparing the treatments.	Calculates statistics related to a randomized experiment using two treatments.	Compares the results of a randomized experiment using two treatments to simulations in order to determine if differences in the treatments are significant.	Designs and runs a simulation to build a distribution for possible differences, for a given experiment.
Detailed	S-IC.B [6]	Determines the question being investigated and the groups that were considered, given a report based on data.	Determines the way randomization was used in the design and the results, given a report based on data.	Evaluates the reasonableness of a report based on data.	Interprets the consequences of the results, given a report based on data, and discusses the statistical validity of the findings.
Detailed	S-CP.A [1]	Identifies an event as a	Identifies or shows	Describes events as	Using complex

		subset of a set of outcomes (a sample space).	relationships between sets of events, using Venn diagrams.	subsets of sample space using characteristics of the outcomes, or using appropriate set language and appropriate set representations (unions, intersections, or complements).	representations, makes sense of outcomes in context. (For example: unions of all subsets would equal the sample space).
Detailed	S-CP.A [2]	Calculates probabilities for events (including joint probabilities).	Identifies whether events are independent or dependent.	Understands that two events, A and B , are independent, if the probability of A and B occurring together is the product of their probabilities, and uses this characterization to determine if they are independent.	Contrasts several events in a sample space and determines if they are independent by calculating the event probabilities.
Detailed	S-CP.A [3]	Understands conditional probability and how it applies to real life events.	Calculates conditional probabilities.	Determines the independence of A and B using conditional probabilities.	Identifies and interprets independence of events in contextual problems, using conditional probabilities.
Detailed	S-CP.A [4]	Constructs two-way frequency tables of data.	Approximates conditional probabilities using two-way frequency tables.	Interprets two-way frequency tables of data and uses them to decide if events are independent.	Constructs, interprets, and finds missing values of a two-way frequency table.
Detailed	S-CP.A [5]	Expresses conditional probabilities and	Interprets conditional probabilities and	Recognizes and explains the concepts of	Using concepts of conditional probability

		independence using probability notation.	independence in context.	conditional probability and independence, in everyday language and everyday situations.	and independence, extrapolates the meaning behind probabilities that were calculated from real-world context.
Detailed	S-CP.B [6]	Distinguishes between compound and conditional probability scenarios.	Finds the conditional probability of A, given B as the fraction of B's outcomes that also belong to A, using a two-way table, Venn diagram, or tree diagram.	Interprets conditional probability in terms of a uniform probability model.	Compares and contrasts conditional probabilities and compound probabilities. (For example: from a table, determines the probability of getting the flu, and then compares that to the probability of getting the flu given the individual never washes their hands).
Detailed	S-CP.B [7]	Recalls the Addition Rule.	Applies the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B) to calculate a probability, in a given context.	Applies the general Addition Rule to a uniform probability model, and interprets the answer in terms of the model.	Applies the Addition Rule to different representations of probability models (Venn diagram, tree diagram, and two-way tables), and interprets the answer in an abstract or real-world context.